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HELIOPHYSICS SUBCOMMITTEE

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MEETING MINUTES



Jill Dahlburg, Chair



Ramona Kessel, Executive Secretary

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Tuesday, March 1, 2016

Welcome, Overview of Agenda

Dr. Jill Dahlburg, Chair of the Heliophysics Subcommittee (HPS) of the NASA Advisory Committee (NAC), opened the meeting by asking those present to introduce themselves. She then reviewed the agenda for the two days of the meeting.

Heliophysics Division Overview, Including Budget Update

Mr. Steven Clarke, Director of NASA's Heliophysics Division (HPD), presented a Division overview.

Budget

For Fiscal Year 2017 (FY17), the President's Budget Request (PBR) for all of NASA comes to roughly \$19 billion. Of this, \$5.6 billion is for science, with \$698.7 million designated for HPD. Congress will make changes, but this is the starting point.

The HPD budget strategy relies on the science priorities delineated in the 2013 Decadal Survey (DS). The first priority is to fund current operating missions and missions in development. Other priorities include maintaining and growing the research award program; ensuring funding for missions in extended operations; growing the future mission wedge; maintaining a viable sounding rocket program; and infusing technology and innovation for the benefit of future heliophysics missions.

While Mr. Clarke was not yet at liberty to share details of the enacted FY16 budget, he did note that some payments will be rephrased to reflect changes in mission progress. For example, the Solar Orbiter Collaboration (SOC) launch was moved to October, 2018, and the Global-Scale Observations of the Limb and Disk (GOLD) guidelines were changed to match the Key Decision Point-C (KDP-C). Missions in prime operations are funded with some minor adjustments. Upcoming Announcements of Opportunity (AOs) include an Explorer in FY16, Solar Terrestrial Probe 5 (STP-5) in FY17, and Living with a Star (LWS) in FY18.

The Office of Management and Budget (OMB) included in the FY17 PBR a mandatory spending increase of \$10 million for cubesats, \$10 million for space weather research, and \$5 million for research and analysis (R&A). Magnetosphere Multiscale (MMS) mission funding will start to decrease as the mission is extended. At the same time, there will be a ramp-up of STP program management. Solar Probe Plus (SPP) is in development and therefore received good support in the funding request. Other missions are making progress to their launch readiness dates.

Dr. Spiro Antiochos asked if there were a way to prevent Congress from decreasing the FY17 budget request, as was done with the actual FY16 budget. Mr. Clarke said that the budget is set for NASA as a whole, though different areas have different champions. HPD seems to come in as a balancing area. He has explained the importance of heliophysics research to Congressional staff, who have a renewed interest in space weather. However, they have many different priorities as well. It would be helpful for members of the science community to weigh in on this, and some are preparing to do so.

Next steps include growth in the Research Opportunities in Space and Earth Sciences (ROSES) competitions, and the implementation of the DRIVE initiative. A draft AO for Explorers is imminent. HPD is always looking for ways to increase the cadence of these missions.

HPD Division Assignments

In December, HPD made some assignment changes, as shown in a revised organizational chart. The Division is currently interviewing for a Chief Scientist, with an appointment likely in April or May. Mr. Clarke described some of the other roles in the Division. Dr. Antiochos expressed concern about program scientists operating in areas where they lack expertise. Mr. Clarke explained that HPD staff often operate on a team basis, and some of the lead positions include an engagement factor beyond the science. The program scientists can champion the various missions and reach back for specific expertise. He is bringing about a system-level, cross-cutting organization. Dr. James Russell pointed out that some names repeat on the organizational chart many times. Mr. Clarke said that adjustments are made according to workload and other situations.

National Space Weather Strategy

Plans for the National Space Weather Strategy were released in late October. There is now a subcommittee on Space Weather Operations, Research, and Mitigation (SWORM), along with a number of working groups that report to SWORM. This is a cross-agency effort. Dr. William Kent Tobiska noted that the community has tried to raise awareness of space weather for 15 years, and it is encouraging that the White House has finally taken it up. Mr. Clarke said that he would welcome HPS input.

SWORM will coordinate Federal efforts to fulfill the National Space Weather Strategy goals and complete the activities of the National Space Weather Action Plan. Specific tasks address budgets, collaboration, and sharing science and technology information with senior policymakers. NASA and other science agencies have briefed OMB on the challenges and near-term opportunities associated with this effort. These include the need for space-based observations, as well as modeling.

Outreach

Mr. Clarke outlined NASA efforts to promote awareness of events related to heliophysics, such as the total solar eclipse occurring the next week in Indonesia. This will be used in part as an opportunity to prepare for the 2017 eclipse in the United States. The 2017 eclipse will, in turn, be a touchstone for sustaining interest in heliophysics and helping people to understand the significance of what HPD supports and studies.

Flight Program Status

Ms. Margaret Luce, HPD Deputy Director, began her update by noting that a sounding rocket had lifted off that morning from the Wallops Flight Facility. It carried an engineering payload and some student payloads.

Ms. Luce then discussed MMS. She noted that the science return from MMS has been fantastic, with the public release of MMS data to occur soon. The mission was to be the subject of a special issue of Geophysical Research Letters (GRL). Ms. Luce agreed to provide a science presentation on MMS at the next HPS meeting.

The next scheduled mission is the LWS Space Environment Testbeds 1 (SET-1), which will launch in March 2017. The hardware has all been delivered, and testing is to be completed this year. The Ionospheric Connection Explorer (ICON) is an Explorer mission for which the instruments are being delivered in preparation for an October 2017 launch. An avionics unit had some issues, but the mechanism is understood and the unit will be delivered in April.

GOLD is an Explorer Mission of Opportunity (MOO) that will be launched on a commercial vehicle. The hardware is currently being delivered and tested, with a launch readiness date of April 2018. SPP will launch in July of 2018, with its system integration review taking place this May. The biggest risk, the Fields whip antennae clamshell device, was retired just the previous day.

NASA is providing two instruments for the SOC. The Agency is concerned about the European Space Agency (ESA) spacecraft part of this mission, specifically in the area of systems engineering. ESA selected a vendor more experienced with communications satellites, and the integration of the science payload is not where it would be in a NASA project, hence the discomfort. Mr. Clarke added that this vendor did not perform well in the Critical Design Review (CDR). There were technical interface issues that have been challenging to overcome, as well as concern about contamination of instruments with the thrusters. Some of their solutions would have affected the science. NASA also felt the engagement with the teams was not optimum, though that is beginning to improve.

Schedule slippage would result in a need for payments to the launch vehicle provider, expenses in keeping the science teams active, and more. NASA has conveyed these concerns to ESA. Ms. Luce explained that HPD has reserves budgeted in case of delay, but would rather not use them. Dr. Jeffrey Newmark added that SOC will use a Venus gravity assist, which has a limited window, plus optimized telemetry. Should SOC miss its October 2018 launch window, the next best time would be in April 2020 to align Venus, Earth, and optimized telemetry. Other times are possible, but these are the best.

Ms. Luce reviewed the “stoplight chart” for development, which was almost entirely green and very positive. Among the operating missions, the only red block was for the Solar TERrestrial Relations Observatory (STEREO) B spacecraft, which has been out of communications for some time. There is still no response, and the team will release a white paper on this by the end of April.

Next, Ms. Luce showed the trajectory of the Gamma-Ray Imager/Polarimeter for Solar flares (GRIPS) flight, which was a balloon campaign in Antarctica. Recent sounding rocket launches include the Hesh mission Black Brant Mk4 from Wallops, which had both technology development and science missions. The Lessard mission had a successful launch from Sweden, but the LaBelle launch in Norway failed.

DRIVE Outlook

Dr. Mona of HPD, the HPS Executive Secretary, discussed the DRIVE program, beginning with a visual depiction of the various elements of the HPS ROSES program. The DS asked HPD to implement DRIVE, which includes small satellites, heliophysics science centers (HSCs), grant programs, and instrument development. Recent budget increases and reallocated funds are allowing HPD to finally move forward with DRIVE. Some of the mandatory funding in the FY17 PBR will go to DRIVE. In addition, the launch of SPP and other missions will allow the Division to fund DRIVE without a budget increase. The FY17 budget will include funds for the HSCs, which will be competed in ROSES 2016. Various budget actions have enabled this, in addition to the OMB increase for 1 year. The hope is that these increases will continue, though the space weather program may affect the situation. Dr. Kessel explained how the rephasing of a few awards allowed HPD to show good stewardship by pushing some funds to the out-years and ultimately granting more awards in FY16.

Dr. Ralph McNutt praised this rephasing and asked how it had been communicated to the community. He noted that sometimes good news needs to be where people can be made aware of it. Mr. Clarke agreed and said that HPD had some ideas on building community awareness. Dr. Tobiska advised making it part of the marketing strategy. The DRIVE initiative came out of the DS, and the success of space weather being grasped by national leadership should be emphasized. Dr. Dahlburg said that she would present this to the NAC Science Committee.

LWS Introduction

Dr. Talaat explained that the LWS Steering Committee (LWS SC) was charged with discussing a targeted research and technology (TR&T) program for LWS. The Steering Committee reviewed the latest strategic report, an assessment report from 2012, a 10-year review from 2013, and the National Space Weather

Strategy and Action Plan. In addition, they discussed how to broaden community input to the LWS SC. The LWS SC was asked to develop a traceability matrix between the SWORM and the action plan goals, while also looking at mechanisms and ideas on how to use the funding for short-term science impacts to support the action plan goals. Finally, the Steering Committee was tasked with assessing how it would evaluate progress toward LWS goals.

Dr. Antiochos noted that involving the community can be a challenge. Dr. Madhulika Guhathakurta of HPD agreed that the science community seldom engages beyond presenting their own issues. In 2007 or 2008, a website allowed opportunities for anonymous feedback and recommendations from the community. It might warrant resurrecting that. Dr. McNutt noted that the Planetary Sciences Division (PSD) held webinars to encourage community engagement, which worked out very well.

LWS Steering Committee Report

Dr. Mark Linton of the Naval Research Lab's Space Science Division, and Dr. Eftyhia Zesta of Goddard Space Flight Center (GSFC), spoke about the LWS SC report. The LWS initiative will support research of those aspects of the sun-Earth system that directly affect life and society. Within LWS, the TR&T components support theory, modeling, and data analysis. The TR&T Steering Committee (TSC) will advise and support NASA in establishing and updating targets and priorities, measuring program progress, and providing mechanisms for monitoring how well the resulting products are translated into societal benefits.

Dr. Linton reviewed the first TSC finding, which outlines a procedure for obtaining community input for the designated science topics, as well as subsequent development of those topics. The seven topics are:

- Solar electromagnetic, energetic particle, and plasma outputs driving the solar system environment and inputs to Earth's atmosphere
- Geomagnetic variability
- Satellite drag
- Solar energetic particles
- Total electron content
- Ionospheric scintillation
- Radiation environment

The five SWORM benchmarks overlap these topics. TSC has a tight schedule that will result in a draft of the topics by June. Several HPS members questioned whether this self-imposed schedule was feasible, but Dr. Linton expressed confidence that TSC could meet it. Dr. Dahlburg wondered if the list of topics might be too short. Dr. Linton explained that TSC was concerned about clustering in areas where the community already works. There was also concern that people might withhold their ideas if they saw related topics. Therefore, it was decided to try to capture interest without voting. Dr. Tobiska added that the science topics will be further matured by the time of the HPS summer meeting.

Dr. Michael Liemohn noted that strategic capabilities need to be addressed. Dr. Talaat replied that the process will deal with them as needed, and TSC is talking to the National Science Foundation (NSF) as well. Dr. Guhathakurta pointed out the need to do gap analysis and identify those gaps requiring investment. When asked what the team would need in order to proceed, Dr. Talaat said that HPS input would be helpful. Dr. Roger Smith asked if TSC had considered that an imbalance of opinion might lead to the community input differing from the real interests. There is a risk that they will think there are other factors. Dr. Zesta replied that the TSC is made up of experts who can evaluate this.

Dr. Zesta described the strategy and action plan that were developed in 2014. Most important is a national action to which the agencies must respond. The action plan has six goals, which she listed. Each goal

must have a response within 2 years, and NASA is not the primary agency on most of them, though the fifth goal, to improve space weather services through advancing understanding and forecasting, is the Agency's responsibility. Each goal has topic areas, which recur throughout.

The timeline is tight. By April, the agencies need to have the first-level benchmarks. An example of the ionizing radiation benchmark made the point that it is extremely detailed. Dr. Zesta said that in the first 6 months, the agencies have to come up with the initial benchmarks, so that the committees can then identify the gaps. She expects the timelines to slip. There is also concern that any distinct new functions that are recommended will lead to retargeting. Dr. Talaat noted that the benchmarking is the responsibility of the responsible agencies. LWS contributes the science behind the benchmarks.

Dr. Zesta explained that the NASA response would require a "tiger team" as the science definition team (SDT). The teams should also be complementary, support the government study board with findings as directed, and identify and implement any short-term science actions that are needed to feed into the second phase of the benchmarking process. The teams will need to be able to work without restrictions on their structures for proposals. Dr. Antiochos expressed concern that this could go outside the Agency's legal rules. He agreed that they are trying to respond to the SWORM plan, but he asked if HPS might think beyond that to what is most sensible to do. Dr. Zesta explained that TSC has only 1 year to use the \$10 million for this task. Mr. Clarke agreed that they need to look at how to do it quickly.

Dr. Heather Elliott said that gap assessment is difficult, and wondered if it could be offered as an opportunity for proposals. Dr. McNutt said that he did not see how it can be done in a year without sending it off to the NASA centers. Mr. Clarke said that the options on how to execute it have not been presented yet. He reminded HPS that the funds are not in the current year, so this is a plan for alignment in preparation for implementation in 2017. He has discussed the timelines with OMB and the Office of Science and Technology Policy (OSTP). They will want to see that progress is being made.

Dr. Tobiska thought that turning it over to the centers would result in pushback from community. Dr. Zesta agreed that this sentiment has already been expressed. Many early career scientists are concerned that the money keeps going to the same "old boys club." Therefore, one idea was to have large workshops allowing the early career people to work with the tiger teams. Dr. Antiochos said that they should work to ensure that this goes beyond a single year.

Dr. Elliott suggested seeking the gap analysis as part of a ROSES call. Dr. Talaat said that there will be multiple approaches, and ROSES is an option. Dr. Mihir Desai said that the \$10 million is very immediate if the PBR is approved. He asked how NASA might build on this and what the plans are for that. Mr. Clarke said that some of the actions in the action plan address this.

Heliophysics Communications

During lunch, Ms. Karen Fox of the NASA Office of Communications (OOC) discussed the ways in which OOC promotes heliophysics. There have been rapid changes in the way NASA communicates its efforts, primarily towards going to the general public and other audiences directly. She noted the various methods that OOC uses.

Figuring out the best metrics is a work in progress. OOC knows the various sectors and, for example, tracks journalists who track NASA via Twitter and Facebook. OOC has not abandoned traditional writing, but they cannot assume that their pieces will be read. Therefore, OOC has developed campaigns, involving pictures with captions. The Solar Dynamics Observatory (SDO) provides the best imagery in the Agency, and OOC can explain it. The Office also does animations and visualizations, with compelling, dynamic images. Scientists often are wary of talking about their work before it is released officially. However, it helps for OOC staff to know in advance what they can develop for a campaign.

A new initiative is the “Science at NASA” website, which is undergoing a massive redesign. It will include a current research section in which investigators will be asked to write several paragraphs about their work. NASA can then promote it. Reddit has the Ask Me Anything (AMA) feature, which NASA will be using during the upcoming eclipse in Indonesia. All these varied communications outlets allow NASA to promote a broader range of scientific research.

OOC also has a strong push to increase collaboration across the Agency, which it is doing through six campaigns: Earth Right Now; International Space Station; Journey to Mars; Solar System and Beyond; Aeronautics; and Technology. Several of these involve heliophysics, which is easier to relate to people’s lives than some other areas, such as astrophysics.

Dr. Tobiska was concerned that the Solar System and Beyond campaign might not be sufficiently clear about heliophysics’ successes, since it covers other science disciplines. Heliophysics needs focus, since not everyone knows what it involves. In addition, space weather is not on the list despite it being a “buzz term.” Dr. McNutt said that there is a great opportunity coming up in the launch of SPP, which will be incredible technologically and scientifically. He hopes that OOC is thinking about how to address this.

Ms. Fox replied that with the 2017 eclipse and SPP, everyone is already excited. SPP already has the attention of OOC and others within NASA. OOC will use the Indonesia eclipse to talk about it, for example. There is a need to determine the goals of communications here, which lead to vocabulary conversations. She wondered if the word “heliophysics” is sufficiently well-known, for example. Congress needs to understand it.

Dr. Tobiska said that there is a need to be very specific about this discipline. Congress is always tempted to cut or combine things, which means heliophysics must be marketed in every way possible. People live by the bullets on lists, and he did not see heliophysics there. Ms. Luce pointed out that if there is a heliophysics bullet and no one pays attention, it does no good. Mr. Clarke asked if the term “heliophysics” resonates with the public. The goal is to get the public more excited about the science.

Dr. Elliott wondered if a unified message with common terms could make communications easier, at least on the higher levels. Ms. Fox agreed about having some high level sentences in common, but otherwise messages differ according to the audience. Dr. Smith noted that the lack of a common word for this area is a problem. Academics know “heliophysics,” but others do not.

Ms. Luce said that the communications campaigns were meant to draw people in, but they are not the same as the reporting by the divisions to Congress. It was more fragmented when each mission promoted itself. Ms. Fox said that when she is excited about heliophysics, she can now talk to others. If the campaign were more focused, she could not. A heliophysics logo might be helpful. Regardless, she finds that heliophysics is being heard more this way. Dr. Tobiska said that it remains unclear where the heliophysics message is coming from, which a more focused campaign would address. A lack of advocacy for the discipline will leave them forever the underdog. They can change that, but the campaigns do not reflect that.

Mr. Dwayne Brown of OOC said that he has been at NASA for 35 years, and he sees that heliophysics is on the cusp of doing some of the greatest things in NASA. The HPD leadership is really engaged and the science is becoming a point of increasing focus. The 2017 eclipse will help enormously.

Payload Adapter Fittings (PAFs)

Dr. Daniel Moses spoke about Payload Adapter Fittings (PAFs), which have been a subject of HPS interest at recent meetings. Dr. Moses works with the cubesat launch initiatives and primarily discussed

Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adaptors (ESPAs). A number of ESPA configurations have been commercially available from Moog CSA since 2010, and the Department of Defense (DOD) implements PAFs. On the NASA side, it is comparatively difficult.

ESPA is well-understood, bigger than a cubesat, and fits on the kind of spacecraft a heliophysics mission might use. The Low-Cost Access to Space (LCAS) program is allowed to predict success to the 80 percent level. Passive secondary payloads are limited in terms of the available orbit, deployment flexibility, and upper-stage restart capability. Propulsion on secondary payloads can be problematic, whereas the ESPA ring reduces interfaces and has the added benefits of a spacecraft tug. A successful example is the Lunar Crater Observation and Sensing Satellite (LCROSS), which successfully flew as a secondary mission with the Lunar Reconnaissance Orbiter (LRO) in 2009. This was the first ESPA ring with on-board propulsion.

Another example is the proposed Example Low-cost Lagrange Investigation Exploration (ELLIE) mission, which was to include an ESPA ring with a coronagraph and solar sail demonstration. It required almost 300kg of propellant. This did not advance into an actual mission, but investigators wrote about the proposal and sent it into review. Dr. Moses listed other ESPA-ring-equipped missions that were either developed or are in process. The technology is mature enough that it should be able to be used. Dr. Moses cautioned that with industry advancing development, NASA should not get involved in that part of it.

Dr. Dahlburg said that one of the HPS interests is in whether Principal Investigators (PIs) can propose these in AOs and have the expense covered as launch costs. Dr. Moses replied that while he cannot discuss upcoming AOs, he has talked with NASA launch vehicle personnel. The best way to proceed seems to be to fund it from the cost cap the PI receives. NASA would take on the risk and the PI would not have to go through the Technical, Management, Cost, and Other (TMC) process. That is the direction of the least resistance, though there are no guarantees.

Dr. Vassilis Angelopoulos said that the APD AO appeared to allow for the possibility of the ESPA ring as part of the launch vehicle cost. Dr. Moses replied that he has not had a lot of encouragement in that direction. Mr. Clarke said that he would like to share this with the rest of the Science Mission Directorate (SMD) so that they can talk about how to address it.

Dr. Tobiska said that cubesats and sounding rockets are evolving, and he understands that the ESPA ring enables many different types of small missions, meaning that the ESPA ring would enable a new range of low-cost missions. Dr. Moses explained that, for comparison purposes, the largest item that could be on an ESPA ring is slightly smaller than what could go on an external International Space Station (ISS) platform, which would be roughly the size of a mini-fridge. Dr. Angelopoulos said that it might make sense to have a dedicated series of these missions, noting that the ESPA ring is an enabler.

Dr. Dahlburg said that HPS would set this issue aside until after Mr. Clarke had had an opportunity to share the information with the rest of SMD. She thanked Dr. Moses for his presentation and thanked Dr. Angelopoulos for not letting the issue drop.

Risk Tolerance and Requirements

Dr. Newmark discussed risk tolerance for missions in development. To begin with, NASA is in the discretionary part of the Federal budget and therefore must prove that it is acting as a good steward of the public trust. Flight projects at NASA are governed by two documents: NPR 7120.5e and NPR 7120.8. The latter defines risk for LCAS projects and has fewer requirements than NPR 7120.5e. There are certain external reporting thresholds that result in additional reports to OMB and Congress. These affect NASA's budget, so Agency personnel must be aware of these. KDP-C is the confirmation point, which makes a mission official. It is the point of formalization. Dr. Newmark presented the cost and schedule reporting

requirements that lead to these further interactions with Congress, OMB, and the General Accounting Office (GAO). There are also milestone reviews.

A few years ago, NASA implemented a 70 percent joint cost and schedule confidence level (JCL). Prior to that, when the JCL tended to be about 50 percent, cost growth was significant. With implementation of the 70 percent JCL, cost growth for SMD missions has been negligible. The 70 percent JCL helps to ensure that the budget and the likelihood of success match. It has introduced more rigor into the cost estimates, as well as more partnering with the community. The calculations leading to the 70 percent JCL involve a large probabilistic analysis. Dr. Newmark offered to provide further information on that either through background materials or in a talk at a future HPS meeting.

He next presented a case study of a Class D mission, which would be an Explorer or Small Explorer (SMEX). There is a perception that policy and practice do not meet the needs of small-scale projects. He pointed HPS to two documents:

- NASA AA letter issued Sep 26, 2014 - Guidance and Expectations for Small Cat3/ClassD Space Flight Projects with a Life Cycle Cost Under \$150M; and
- http://nodis3.gsfc.nasa.gov/OCE_docs/OCE_25.pdf

The PI will need to tell NASA what risk he or she wants to assume and why. Much of this involves tailoring, which TMC will take into account. The letter from the SMD Associate Administrator (AA) mentions tailoring repeatedly. TMC was told that Class D PIs are allowed to tailor certain elements, though they must justify this. Dr. Newmark provided another link that provides background on how TMC will look at the tailoring of requirements:

- http://essp.larc.nasa.gov/EVM-2/pdf_files/OnClassCandClassDPayloadsTMC.pdf

Dr. Newmark has talked to TMC about this document. It gives the PIs the inroads to acceptance. The community has said that Technology Readiness Level (TRL) 6 is required for acceptance, but that is not true. However, the proposer must tell TMC about the *de facto* TRL; if this explanation is missing, TMC will assume that the project does not meet the requirements. It is up to the PI to make this point. NASA is trying to address the ambiguity that the community notices, and it would help if there were comments made on the draft AOs. TMC makes risk assumptions, and projects still must reach TRL 6. However, a high-risk development project can be selected if it has a high payoff.

Dr. Bart De Pontieu said that there is a difference between how TMC and proposers see risk. Dr. Newmark encouraged him to review the language and suggest alternatives. This has not evolved in order to throw out high risk. Rather, NASA is trying to find the optimal risk, while also having a different risk acceptance for Class C and Class D.

Dr. Newmark next showed the programmatic structure, noting the individuals on the team who can address problems. NPR 7120.8 is the document governing lower-cost efforts that frequently come through ROSES, Heliophysics Technology and Instrument Development for Science (H-TIDES), and LCAS. Investigation science questions do not require closure; investigation objectives need to be proposed in terms of observations and technology, and these do require closure. The objective might be technology, in which case the PI should state the objective and meet it in terms of observations and/or technology. These are the areas in which investigators can do technology development.

This is the path for going from a low TRL to a higher TRL. NASA is promoting this path so that investigators can later propose the more-developed TRL as part of another project. A PI who wants to propose technology development that could be applied to science needs to state that the new technology must go into space in order to be tested and enable application of the technology to a future mission. This

will be more explicit in the next AO and ROSES call. Dr. Kessel added that the review panels will be instructed on this, and HPD staff will be at the reviews.

Dr. Newmark pointed out that the LCAS requirements are now more explicit. It is important to read the announcements because they change. HPD wants to provide a place where people can take risks. The Division tries to get the right mix of people on the peer review panels so that they can accurately evaluate the likelihood of technical success. If necessary, HPD will pull in an expert opinion. On future LCAS proposals, HPD hopes to institute a way to get all proposal information to headquarters to show that progress is being made. Reports are helpful, and reports made to entities are often sufficient. SMD has promoted public access to data. The LCAS missions that have deposited their data in the public archives have seen their publications obtain greater visibility. Other people publish with LCAS data, using it in the same way as if it were from a large flagship mission.

Subcommittee Discussion

In discussion, Dr. Dahlburg returned to the LWS SC report. The issue was with the three findings, the third of which has not been released. Dr. Linton said that he believes the timeline is feasible, though it will be a lot of work. If they can get the advertisement out by mid-March, they can have the process going by early May, then have a draft in early June with the presentation later that month or in July. This is for the 2017 ROSES call, which HPD will start working on in September 2016. This will be a three-meeting process. Dr. Antiochos noted that what seems to be new is putting out draft topics for community comment. Dr. Dahlburg asked if HPS wanted to vote on the findings separately. They did, and the vote was unanimous in favor of Finding 1 going forward.

The second finding was the long-term alignment and development of a traceability matrix between TR&T benchmarks and the SWORM goals. Dr. Zesta said that at the second meeting, TSC will develop findings on how to address the SWORM goals. She explained that a “tiger team” is made up of the experts needed to solve a difficult problem. For each benchmarking activity, they would need the best experts from the community. She assumed there would be at least 10 people on each team. TSC can prepare people to submit white papers. Dr. Dahlburg said that the finding needed clarity. As it is, the finding just says there will be tiger teams ready. Dr. Talaat said that they wanted ideas for mechanisms and were recommending tiger teams.

Dr. Guhathakurta urged caution on conflict of interest. TSC was set up to allow the members to propose, with NASA doing a blind selection. Dr. Talaat said that they wanted input on mechanisms and therefore the vagueness was appropriate. Dr. Desai asked if TSC could operate like the DS panel, which has funds to produce a report over the course of a year. Dr. Antiochos did not like the tiger team concept, which meant that it existed for one task. The goal is to get a program started. Dr. Zesta agreed, and Dr. Linton said that it could be that tiger teams are not what they really want. He suggested a term like “targeted team” or something else with longer-term implications. The concept of setting up a group quickly was their aim in the finding.

Dr. Liemohn was concerned about the benchmarking, which Dr. Talaat said would flow into all other activities. Dr. McNutt advised dropping the implementation portion of the last bullet in Dr. Zesta’s first finding. Others agreed. Dr. Guhathakurta was concerned that the tiger teams would be too specific in directing science, creating a conflict. It might be best to keep the groups separate, then pull them together like an architecture team once their initial work is done.

Dr. Tobiska said that there had to be a process in NASA with specific benchmarks and gap assessment. They could have the centers do it, set up other mechanisms, or establish groups of experts. Dr. Talaat said that the charge was to come up with a scientific mechanism to aid in benchmarking. As for the tiger teams, Headquarters would determine the means of forming them. The agencies are responsible for the

benchmarks. The analysis will provide input NASA can take back and show to other agencies. His group sought a mechanism to enable that. The TSC would do the science to feed into the benchmarks that other agencies are now defining, but TSC is not doing the benchmarks. Dr. Talaat agreed that it is important to continue whatever activity TSC takes up, but they must make this first funding effective. The finding was not meant to imply that the tiger teams were the only option. Dr. Elliott said that there was too much text in the finding, with too much detail, and she did not think that HPS should vote on the entire piece.

Dr. Dahlburg reiterated the charge, which was to come up with a mechanism to have high-impact science done to enable the benchmarking effort. The idea is to have groups of some sort for each of the five benchmarks. She noted that no one liked the finding as presented. Dr. Kessel pointed out that TSC cannot directly advise HPD. TSC is reporting to HPS because HPS can directly advise HPD. Dr. McNutt said that too many HPS members were not happy with the finding because it was too vague. He wondered if it could be redrafted. Dr. Tobiska suggested that the Subcommittee could write something simpler in its report to HPD, and Dr. De Pontieu advised having a finding that this is not a short-term project.

Dr. Talaat said that they were looking for input. However, he and Dr. Dahlburg agreed that the discussion, as presented in the meeting notes, could serve as the input. He thanked Drs. Linton and Zesta, and Dr. Dahlburg thanked the HPS members for the stimulating discussion. Drs. Desai and Tobiska agreed to write something for the letter.

Dr. Dahlburg next raised the subject of risk analysis. Dr. Kessel noted that Dr. Newmark described a draft of the reporting requirements, which are a work in process. The ROSES draft was complete, but investigators could still comment, and she advised HPS members to read the latest iteration. It would be helpful to receive their feedback. There has been a process for reviews of sounding rockets and balloons; nothing like that exists yet for cubesats. Dr. Dahlburg said that they should review the documents in Dr. Newmark's presentation in order to determine how much freedom investigators have.

When asked if any proposal that had a tailoring element had been accepted, Mr. Clarke said that he did not know about HPD, but there have been tailored sections selected elsewhere. The proposers were very explicit as to why they could not be at TRL 6 yet. If the investigator can provide a rationale, the proposal should be considered fairly. He remains concerned that there are issues with the high-risk proposals getting past TMC, and he was also concerned about categorization. If a PI proposed compelling science that was high-risk and rejected, that would warrant wariness in the future. NASA wants to enable cutting-edge, compelling proposals to see if the risk is worth taking. Whether TMC considers it the way NASA wants them to is another question. He was not convinced that the problem is solved. HPD needs to provide clarity in the updated documents, and he wondered if they had gone far enough. It could be possible that they need to interface more with TMC. Dr. Dahlburg said that HPS needed time to read the documents. She put this on the agenda for the next day's discussion, and observed that they may need further discussion at the HPS summer meeting.

Adjourn

The meeting was adjourned at 5 p.m.

Wednesday, March 2, 2016

Top-Level ROSES 2016 Changes – Response to HPS

After a quick review of the agenda and a roll call of HPS members, Dr. Dahlburg turned the meeting over to Dr. Kessel, who discussed the recent ROSES changes. These were made partly in response to HPS suggestions to either increase grant size or reduce the number of pages to 10. At this point, HPD has increased the award size for the Heliophysics Supporting Research (HSR) program. Dr. Kessel provided

data on HSR awards in recent years. The pre-calculated average award size, which is based on what HPD expected to award, was \$93,000 in 2013 and \$148,000 in 2015. The target amount for the 2016 awards is \$200,000 - \$250,000. The Division anticipates making 16-20 new awards, and expects the proposals to be for larger efforts involving more people. This will provide additional funds for early career researchers, “summer salaries,” postdoctoral fellows, and the like.

Dr. Desai asked if there were an HPD program to support early career researchers specifically. He thought this should be part of the DRIVE initiative. Dr. Jeffrey Hayes of HPD cautioned that, for an APD program targeting early career researchers, some researchers became isolated and concomitantly did not get tenure. It was opposite of what the Division expected. APD terminated the program, which provided 5-year grants. Dr. Liemohn said that there are fellowships offered by HPD as augmentations, and Dr. mentioned HPD’s Presidential Awards. Discussion resulted in suggestions for a separate line for early career investigators, a small program, programs that are not tied to the centers, or a short-duration program. Dr. Arik Posner noted that HPD has given awards to a number of early career researchers.

Dr. Kessel next provided a list of the 2016 ROSES elements, though some were marked as To Be Developed (TBD) and not all of the others have been written and defined. Among the TBDs will be a USPI element for research based on missions from other countries. In addition, HPD will reduce the number of pages from 15 to 10 as a test case in the Guest Investigator (GI) proposals, which are generally less complicated than other proposals.

Dr. Kessel next presented an analysis of the panel review process. After studying a number of measurements, HPD determined that the two-step proposal process had not worked as hoped. The percentage of proposals discouraged in the first round of reviews would have to be about 50 percent for the process to be successful, but it is around 32 percent, which is not enough to justify the extra review. Therefore, HPD has cancelled the Step-1 review for 2016 for all of ROSES, though Step-1 proposals will still be required in order to inform HPD staff of the proposals and allow them to start looking for panelists to evaluate Step-2 proposals. Dr. McNutt advised archiving this analysis and the underlying data. Dr. Kessel added that HPD looked at other ways to handle this but could not come up with anything they were comfortable implementing. Mr. Clarke said that community input has been quite varied.

Dr. Antiochos suggested having shorter proposals, though Dr. Dahlburg said that this could work to the disadvantage of entry-level proposers, who may need more text to explain themselves and their capabilities. Dr. Kessel reminded HPS that HPD was testing 10-page proposals for the GI area. If that experiment is successful, the Division will decide whether to extend it. There will be no “discouraged” proposals for ROSES 2016, and no Step-1 review. Dr. Tobiska said that he had heard that people were submitting Step-2 proposals despite being discouraged in Step-1, because there was no penalty for that submission.

R&A Programs Update/ROSES 2015 Assessment

Dr. Posner gave a presentation on ROSES funding trends, the Step-1 process for ROSES 2013-15, and ROSES 2016 plans. There has been a trend to more proposals over time, although there have been decreases at times due to funding fluctuations, including one year in which there was no GI funding. In addition, the Theory program is not competed every year. For ROSES 2015, the overall award rate was about 18 percent. Aside from the year with no GI funding, the number of selected proposals has held steady over the years. The review season was compressed by the step program, which created a burden for the community with the panels all occurring at once. Dr. McNutt reported that he had heard they were having increasing difficulty getting panelists. Dr. Kessel said that there are many factors involved, including that most people propose. Early career scientists often volunteer, but they cannot make up the bulk of the panels. This results in HPD seeking reviewers from outside the country. The Division is still looking for a solution. Dr. Desai advised them to continue having a student serving as executive secretary.

Dr. Posner said that additional elements in ROSES this year creates a further squeeze, on top of the limited times available for reviewing. He showed the HSR Step-1 data from 2014, when 64 percent were encouraged. A proposer gender imbalance of mostly men that year did not recur. While almost all of the proposers who were encouraged submitted to Step 2, as many as one-third of those who were discouraged submitted as well. A good number of those who were discouraged were competitive, and therefore it was possible for them to compete.

Dr. Liemohn noted that the discouraged proposers likely put in extra effort in Step 2, and Dr. Desai pointed out that after word got out that some discouraged proposals were funded, more PIs with such proposals submitted thereafter. Dr. Posner showed that overall, for ROSES 2014, 21 percent of those who were encouraged and submitted to Step 2 were funded, while 14 percent of those who submitted to Step 2 despite being discouraged were funded. Some of the numbers were small, meaning that the data were not statistically significant. However, for 2015, 17 percent of the encouraged and 23 percent of discouraged who proposed in Step 2 were funded. The number of discouraged proposals was always lower, however.

The mail-ins for Step 1 proposals were not conflicted and did not propose. Dr. Antiochos urged caution in comparing mail-ins to panels. The panel process often relies heavily on a single expert. A mail-in allows more thought and investigation. Dr. Posner said that for ROSES 2016, HPD is asking for panel volunteers for all program elements. He presented the due dates, and Dr. Kessel explained that LWS has shifted due to new leadership and the fact that it has not yet been defined. HPD is also trying to spread these out more. Dr. Posner noted that the GI panel is now very early. Three programs are still without due dates.

Dr. McNutt asked about the structure of the science centers and how they will interact with NSF. This is a source of concern within the community. Dr. Posner replied that HPD staff frequently talk to NSF staff. Among other things, they work to ensure that the two agencies have not funded the same proposals. Other topics include the science centers and cubesats. Dr. Talaat added that HPD is in preliminary discussions with NSF to formalize an agreement that might cover the science centers. NSF has no science center funding for FY17. Dr. McNutt observed that the lack of information is leading people to speculate in ways that are not always helpful. Dr. Kessel said that the next communication to the community may be the ROSES call. Dr. Liemohn urged HPD to get the science center information out quickly, because it takes time to plan.

Dr. Posner said that HPD wants to issue the science center call, but the staff also want recommendations. Dr. Kessel asked if it might make sense to have a 1-year SDT to flesh out the community view of what the science centers should be. This could be in the ROSES call. Dr. McNutt was concerned that that might appear to be a delay in handing out funds. Several HPS members indicated that they would be more comfortable with a NASA-formed committee. Other suggestions included going through the National Research Council (NRC) or involving the Management Operations Working Groups (MOWGs)

Big Data Task Force Update

Dr. Hayes explained that the Big Data Task Force (BDTF) is a new Federal Advisory Committee Act (FACA) subcommittee chartered to look at the needs of the science community in the era of big data. BDTF will make findings to the NAC Science Committee and will be dissolved at the 2-year mark. While different space science disciplines have come to big data at different rates, all are struggling with it now. The SDO already has a petabyte of data, and simulations and modeling data constitute another issue. The data have reasonable standards right now, but those standards should be transferrable to the simulators and modelers. Dr. Hayes urged HPS to be proactive about this. The issue is not so much the format as the key words. Those have not all been developed. It is part of the meta-data standard, and one BDTF goal is to expand that. Three of the four NASA science divisions are taking a similar approach to accessibility, which will be a big expense. The other issue is that the divisions will have to ask ROSES proposers where

the data products will live – at the proposer institution or with the government. Funding is yet another consideration.

The BDTF discussed science papers based on analysis of the data, simulations, and modeling. There is the line of thinking that when the data go into a paper, the paper should be publicly accessible. However, there are commercial entities that do the publishing and have copyrights. The National Institutes of Health (NIH) have a system for this. Dr. McNutt asked what the data holdings across SMD are expected to be over the next 10 years. Dr. Hayes replied that there have been some projections of exponential increases.

Dr. Hayes also explained that SMD commissioned a study of the senior review process. The National Academies of Science (NAS) are favorably disposed to making a recommendation to change the cadence of the senior reviews. The Earth Science Division (ESD) wants to have them every 2 years, while PSD would prefer to have them less often. The recommendation was evolving to having the reviews in a flexible 2-to-4-year timeframe. Congressional staff indicated that they were open to this. Congress originally wanted the reviews annually, but compromised at 2 years. The draft report should be out in September. Mr. Clarke added that the division directors all liked the idea of having flexibility within a 2-to-4-year timeframe. If they do get flexibility, HPD would like community input on the cadence.

Dr. Desai said that it would be good to have a list of the NRC studies involving HPD. Mr. Clarke knew of only two, this and one on small satellites. Dr. Desai said it would be helpful to have the cubesat report presented to HPS.

ROSES Survey Results

Dr. Kessel explained that HPD put together a quick survey for panelists for some ROSES reviews last fall: GI, HSR, and LCAS. The number of responses is small. The survey asked panelists a number of questions, including the number of times they have been on a NASA panel. It also asked if they had both proposed and been awarded grants. About half to two-thirds answered that they had. The other questions addressed the review system, which most panelists believed to be effective. The last question was about whether similar or better results could be achieved with less effort, and there were few responses that indicated the subjects thought less effort was possible. Handwritten comments were reviewed but not categorized. Overall, the results of this anonymous survey were positive. Mr. Clarke said that it would be better to emphasize what PIs need to provide in order to make proposals more successful and easier for reviewers.

Dr. Antiochos said that all of the many panels he has been on said the same thing: “it was tough, and we were good.” He would not read into it that the process has been optimal. There are issues. The psychology of the people on the panel can make or break them. Dr. Desai said that the community perceives randomness in the reviews. He suggested having reviewers read more proposals, because the primary and secondary reviewers carry too much weight and drive the decisions. Perhaps a tertiary reader would help, or even a fourth reader now that the proposals are shorter. Dr. Smith said that the lead and secondary point out issues, after which the other panelists should weigh in. The chair’s job is to involve the panel in discussion. Dr. Desai replied that it does not happen that way.

Dr. Angelopoulos said that it should be possible to learn from the successful proposers and streamline the writing based on that. He wondered if there could be online presentations on how to write proposals, and have structured proposals that lend themselves to questions. Dr. Newmark explained that he and Dr. Kessel conducted a proposal writing workshop a few years ago. They could resurrect that and put the slides online. It was also noted that PSD has workshops, as does GSFC.

Dr. Tobiska suggested having a quad chart as the first page of proposals. This would make PIs create a graphic of the concept that the reviewers could refer to easily. Dr. Elliott recommended sharing the panel

review form with proposers, so that they can see how the proposals are evaluated. Dr. Kessel added that the PI survey was about to go out via SurveyMonkey in order to obtain more input. She planned to share the results at the next HPS meeting.

Discussion of Topics

Dr. Dahlburg listed the following as topics for HPS to consider further, along with the topic leaders:

- Proposal writing workshop, Drs. Liemohn and Angelopoulos
- Risk tolerance, Dr. Angelopoulos
- Summer presentation on science centers, Dr. McNutt
- Separate funding for early career researchers, Drs. Desai and Angelopoulos
- Step 1 review, all
- SWORM, Dr. Desai
- DRIVE presentation, Drs. Angelopoulos and Antiochos
- Good stewardship from the LWS presentation, Dr. McNutt
- Communications discussion and space weather, Drs. Tobiska and Antiochos

It was agreed that cubesats would be part of the risk tolerance piece, and that they would discuss PAFs separately.

HPS Working Time to Develop Findings

HPS reviewed what they had in terms of findings in order to determine what gaps existed and what might need to be changed. In addition to the items of consensus, Dr. Dahlburg raised the issue of the PAFs and the presentation by Dr. Moses, noting that Mr. Clarke said he would discuss it with SMD leadership. She planned to update the Science Committee. Next was Dr. Newmark's briefing about risk tolerance, which HPS needed to discuss further, especially in regard to cubesats. It was decided that risk tolerance would be a topic for the summer meeting, with an emphasis on cubesats. Further discussion among HPS members led to a growing consensus that cubesat reviews should be similar to those for sounding rockets.

Dr. McNutt sought a recommendation that HPD should define an implementation plan and timeline for the science centers in the DRIVE initiative. He felt that the centers remain ill-defined, and that timely action is needed. He also wanted an update at the next meeting. Dr. Kessel said that they would think about options, including engagement with the MOWGs.

Debrief with Heliophysics Director

Dr. Dahlburg welcomed Mr. Clarke back to the meeting and began the debriefing. She noted the highlights of his presentation, including DRIVE, the Space Weather Action Plan, the establishment of the Division's Chief Scientist position, and the SWORM activities. HPS was glad to see that the upcoming eclipses will be used to help focus attention on heliophysics. She commended HPD for doing so well in the proposed budget. She next gave Ms. Luce kudos for her discussion of flight programs, and especially the MMS data release and the strong science return. HPS was gratified to learn that the developing mission status and operating mission status lines are mostly green. It was also good to hear about the success of the sounding rocket program and the 6-year anniversary of SDO. The Subcommittee was concerned, however, about HPD staff being over-multitasked, and therefore would like a briefing on staffing adequacy at the next meeting.

Dr. Antiochos commended HPD for the proactive stance on DRIVE and the balanced implementation. Dr. McNutt said that the FY17 PBR includes an increase in HPD funds. The Division's rephrasing of funds is commendable, as it leads to a healthy grants program and shows good stewardship. Dr. Dahlburg commended Dr. Talaat for the LWS update. Regarding the TSC, HPS concurred with Dr. Linton's recommended procedure and provided verbal input to Dr. Zesta for her finding. Dr. Elliott reported the

HPS recommendation that HPD investigate developing a broad community program by which the Division would effectively provide the science R&A required by the success of SWORM. This is in response to the additional \$10 million allotted to the LWS program for providing benchmarks, identifying knowledge gaps, and developing other information requested by the SWAP.

Dr. Tobiska said that the visibility of heliophysics programs and activities should be elevated within NASA communications through a new campaign focused on the nation's rapidly increasing space-based assets. This recommendation reflects the fact that it is not always obvious within current campaigns where heliophysics activities have made strong contributions. Dr. Russell commended HPD for its investigation of PAFs, which will enable a wider range of SMEX mission orbits to be attained. Dr. Dahlburg acknowledged Dr. Angelopoulos for spearheading this effort.

She next thanked Dr. Newmark for his comprehensive briefing on risk tolerance. HPS will study his materials and discuss the topic further at the summer meeting, with the emphasis on cubesats and LCAS. She also noted Dr. Kessel's talk about the changes in ROSES 2016. Dr. Antiochos added that the two-step process experiment was conducted well. As it did not seem to be succeeding, HPD has moved away from the process, and HPS concurred with that decision.

Dr. Elliott presented the recommendation on early career funding, stating that HPD should assess the possibility of creating a new ROSES element exclusively supporting early career researchers. This would be separate from the postdoctoral program. Dr. Dahlburg thanked Dr. Posner for the ROSES assessment and noted HPS interest in the science centers. Dr. McNutt elaborated, stating that HPD should define and provide an implementation plan and timeline for the science centers, with community input and possibly through the use of a "tiger team" of community researchers. Specifics should be presented at the next HPS meeting.

Dr. Liemohn reported that Dr. Kessel's presentation of the reviewer survey results led to a recommendation that HPD develop and regularly hold proposal writing workshops to instruct researchers in the best practices of successful proposals. Dr. Dahlburg thanked Dr. Hayes for his briefing on the BDTF and for his information about the potential for flexibility in the cadence of senior reviews. Finally, she thanked Dr. Kessel, the HPD staff, and others.

Mr. Clarke thanked HPS for their good discussion, insight, input, and time. He felt they were moving in a good direction.

Adjourn

The meeting was adjourned at 4:02 p.m.

Appendix A Attendees

Heliophysics Subcommittee members

Jill P. Dahlburg, Naval Research Laboratory, Chair

Ramona Kessel, NASA HQ, Executive Secretary

Vassilis Angelopoulos, UCLA

Spiro Antiochos, NASA GSFC

Bart W. De Pontieu, Lockheed Martin

Mihir Desai, Southwest Research Institute

Heather A. Elliott, Southwest Research Institute

Michael W. Liemohn, University of Michigan

Ralph L. McNutt, Jr., Johns Hopkins University

Neil Murphy, Jet Propulsion Laboratory

James Russell III, Hampton University

Roger W. Smith, University of Alaska

William Kent Tobiska, Space Environment Technologies

NASA Attendees

Gabriel Adler

Ralph Beaty

Steve Clarke, HPD Director

Karen Fox

Madhulika Guhathakurta

Jeffrey Hayes

Jennifer Holt

Jennifer Kearns

Guan Le

Peg Luce

Lis McDonald

Jeff Morill

Dan Moses

Jeffrey Newmark

Arik Posner

Joe Smith

Elsayed Talaat

Dan Woods

Eftyhia Zesta

Other Attendees

LaMont DiBiasi, SWRI

David Gump, Deep Space Industries

Grace Hu, OMB

Ben Kallen, Lewis-Burke Associates

Mark Linton, NRL

Elizabeth Sheley, Zantech IT

Appendix B
Subcommittee Membership

Jill P. Dahlburg, Chair

Naval Research laboratory

Ramona Kessel (Executive Secretary)

NASA HQ

Vassilis Angelopoulos

UCLA

Spiro Antiochos

NASA GSFC

Bart W. De Pontieu

Lockheed Martin

Mihir I. Desai

Science and Engineering Division

Southwest Research Institute

Heather Elliott

Southwest Research Institute

Maura Hagan

National Center for Atmospheric Research

Michael W. Liemohn

University of Michigan

Ralph L. McNutt, Jr.

Johns Hopkins University

Neil Murphy

Jet Propulsion Laboratory

James Russell III

Hampton University

Roger Wilford Smith

University of Alaska - Fairbanks

William Kent Tobiska

Space Environment Technologies

Appendix C

Presentations

1. *Heliophysics Division Overview*, Steven Clark
2. *Flight Program Status*, Margaret Luce
3. *Revised DRIVE Outlook*, Mona Kessel
4. *TSC Findings on the Space Weather Operations, Research and Mitigation (SWORM) Task Force Report*, Elsayed Talaat
5. *Living with a Star Targeted Research and Technology (TR&T) Steering Committee*, Mark Linton
6. *TSC Findings on the Space Weather Operations, Research and Mitigation (SWORM) Task Force Report*, Eftyhia Zesta
7. *Optimized Orbit for Secondary Heliophysics Payloads: Propulsive ESPA*, Daniel Moses
8. *Risk Tolerance (Tailoring and Awareness) and Requirements*, Jeffrey Newmark
9. *Changes to ROSES Elements*, Mona Kessel
10. *Heliophysics R&A Update*, Arik Posner
11. *ROSES 2015 Survey Results*, Mona Kessel

Appendix D
Agenda

**Heliophysics Subcommittee Meeting
March 1-2, 2016**

Tuesday March 1; 3H41

8:30 Subcommittee Room Open

9:00 Welcome, Overview of Agenda J. Dahlburg, HPS Chair

9:15 Heliophysics Division Overview
including Budget update S. Clarke, NASA HQ

10:00 Flight Program Status P. Luce, NASA HQ

10:30 BREAK

10:45 DRIVE Outlook M. Kessel, NASA HQ

11:10 LWS Introduction E. Talaat, NASA HQ

11:20 LWS Steering Committee Report M. Linton/NRL, E. Zesta, NASA GSFC

12:30 LUNCH: Heliophysics Communications, K. Fox

1:45 Payload Adapter Fittings (PAFs) D. Moses, NASA HQ

2:30 Risk Tolerance and Requirements. J. Newmark, NASA HQ

3:15 BREAK

3:30 Discussion of risk intolerance Subcommittee

5:00 ADJOURN

Wednesday March 2: 3H41

8:30 Subcommittee Room Open

9:00 Top-level ROSES 2016 changes – response to HPS M. Kessel, NASA HQ

9:30 R&A programs update/ROSES 2015 assessment A. Posner, NASA HQ

10:10 ROSES Survey results M. Kessel, NASA HQ

10:30 BREAK

10:45 Big Data Task Force Update J. Hayes, NASA HQ

11:10 Discussion of topics Subcommittee

12:00 LUNCH

1:15 HPS working time to develop findings Subcommittee

3:15 Discussion, including future meeting dates, potential agenda topics, action items Subcommittee

3:30 Debrief with Heliophysics Director S. Clarke, NASA HQ

4:00 ADJOURN